IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:		
Applicant:	:	Timothy Good
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Title of Invention	:	BIOPTICAL POINT-OF-SALE (POS) SCANNING SYSTEM EMPLOYING DUAL POLYGON-BASED LASER SCANNING PLATFORMS DISPOSED BENEATH HORIZONTAL AND VERTICAL SCANNING WINDOWS FOR 360° OMNI-DIRECTIONAL BAR CODE SCANNING
Examiner	:	not yet assigned
Group Art Unit	:	2876
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Honorable Commissioner of Patents
and Trademarks
Washington, DC 20231

INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. 1.97

Sir:

In order to fulfill Applicant's continuing obligation of candor and good faith as set forth in 37 C.F.R. 1.56, Applicant submits herewith an Information Disclosure Statement prepared in accordance with 37 C.F.R Sections 1.97, 1.98 and 1.99.

The disclosures enclosed herewith are as follows:

U.S. PUBLICATIONS

NUMBER	FILING DATE	TITLE
6,330,973 B1	May 6, 1999	INTEGRATED CODE READING SYSTEMS INCLUDING TUNNEL SCANNERS
6,237,852 B1	September 9, 1998	MUTLIPLE PLANE WEIGH PLATTER FOR MULTIPLE PLANE SCANNING SYSTEMS
6,223,986 B1	April 10, 1998	AIMING AID FOR OPTICAL DATA READING
6,213,397 B1	December 7, 1998	MULTIPLE WINDOW SCANNER AND METHOD FOR ADJUSTING OPTICAL

		PARAMETERS
6,117,080	June 4, 1997	ULTRASONIC IMAGING APPARATUS AND METHOD FOR BREAST CANCER DIAGNOSIS WITH THE USE OF VOLUME RENDERING
6,098,885	October 3, 1997	COUNTERTOP PROJECTION LASER SCANNING SYSTEM FOR OMNIDIRECTIONAL SCANNING VOLUME PROJECTED ABOVE A COUNTERTOP SURFACE OF CODE SYMBOLS WITHIN A NARROWLY-CONFINED SCANNING
6,069,700	July 31, 1997	PORTABLE LASER DIGITIZING SYSTEM FOR LARGE PARTS
5,886,336	December 12, 1996	MULTI-SIDE COVERAGE OPTICAL SCANNER
5,869,827	August 15, 1997	MULTIPLE WINDOW SCANNER AND METHOD FOR MULTIPLE FOCAL DISTANCE READING
5,837,988	February 26, 1997	MULTIPLE PLANE SCANNING SYSTEM FOR DATA READING APPLICATIONS
5,834,708	October 5, 1995	MULTIPLE PLANE WEIGH PLATTER FOR MULTIPLE PLANE SCANNING SYSTEMS
5,801,370	August 21, 1996	MULTI-DIRECTIONAL BAR CODE READING DEVICE
5,723,852	June 5, 1995	CHECKOUT COUNTER SCANNER HAVING MULTIPLE SCANNING SURFACES
5,705,802	November 7, 1995	MULTIPLE PLANE SCANNING SYSTEM FOR DATA READING APPLICATIONS
5,693,930	July 29, 1996	AUTOMATED PACKAGE IDENTIFICATION AND MEASURING SYSTEMS EMPLOYING MULTI-FOCAL POLYGONAL-BASED LASER SCANNING TUNNEL SYBSYSTEMS

5,689,102	August 11, 1995	PORTABLE MULTI-DIRECTIONAL BAR CODE SCANNER
5,684,289	October 30, 1995	OPTICAL SCANNER HAVING ENHANCED ITEM SIDE COVERAGE
5,557,093	December 28, 1994	COMPACT PROJECTION LASER SCANNER FOR PRODUCING A NARROWLY CONFINED SCANNING VOLUME FOR OMNI-DIRECTIONAL SCANNING OF CODE SYMBOLS THEREIN, WHILE PREVENTING UNINTENTIONAL SCANNING OF CODE SYMBOLS ON NEARBY OBJECTS
5,495,097	September 14, 1993	PLURALITY OF SCAN UNITS WITH SCAN STITCHING
5,491,328	January 26, 1994	CHECKOUT COUNTER SCANNER HAVING MULTIPLE SCANNING SURFACES
5,475,207	November 19, 1993	MULTIPLE PLAN SCANNINGSYSTEM FOR DATA READING APPLICATIONS
5,459,308	October 17, 1995	DUAL APERTURE OPTICAL SCANNER
5,361,158	May 20, 1993	MULTIPLE SOURCE OPTICAL SCANNER
5,286,961	May 26, 1992	BAR CODE READER PRODUCING TWO GROUPS OF VERTICAL SCAN LINES AND TWO GROUPS OF INCLINED SCAN LINES ON A PLANE NORMAL TO THE READ WINDOW
5,229,588	September 30, 1991	DUAL APERTURE OPTICAL SCANNER
5,206,491	February 28, 1991	PLURAL BEAM, PLURAL WINDOW MULTI-DIRECTION BAR CODE READING DEVICE
5,132,524	May 21, 1990	MULTI DIRECTIONAL LASER SCANNER
5,073,702	March 26, 1990	MULTIPLE BEAM BAR CODE SCANNER
5,039,184	June 26, 1989	OPTICAL BEAM SCANNER FOR BAR-

		CODE
5,026,975	February 17, 1989	BAR CODE LASER SCANNER ARRANGEMENT FOR A CASHIER STAND
5,000,529	April 17, 1990	OPTICAL SCANNER
4,960,985	September 27, 1989	COMPACT OMNIDIRECTIONAL LASER SCANNER
4,861,973	June 18, 1987	OPTICAL SCAN PATTERN GENERATING ARRANGEMENT FOR A LASER SCANNER
4,795,224	October 6, 1986	OPTICAL SCANNING PATTERN GENERATOR
4,794,237	November 10, 1986	MULTIDIRECTIONAL HOLOGRAPHIC SCANNER
4,652,732	September 17, 1985	LOW-PROFILE BAR CODE SCANNER
4,647,143	April 4, 1984	LIGHT-BEAM SCANNING APPARATUS
4,333,006	December 12, 1980	MULTIFOCAL HOLOGRAPHIC SCANNING SYSTEM
4,093,865	April 29, 1977	CODE SYMBOL SCANNER USING A DOUBLE X BAR PATTERN
3,947,816	July 1, 1974	OMNIDIRECTIONAL OPTICAL SCANNING APPARATUS
3,902,048	July 11, 1974	OMNIDIRECTIONAL OPTOMECHANICAL SCANNING APPARATUS

FOREIGN PUBLICATIONS

NUMBER	PUBLICATION DATE	TITLE
WO 99/01839	January 14, 1999	METHOD AND DEVICE FOR READING OF A BARCODE ON AN ARTICLE

0 663 643 A2	July 19, 1995	AUTOMATIC PACKAGE LABEL SCANNER
US 2001/0017320	August 30, 2001	PROJECTION LASER SCANNER FOR SCANNING BAR CODES WITHIN A CONFINED SCANNING VOLUME

TECHNICAL PUBLICATIONS

Product Brochure for the Magellan SL 360-Degree Scanner/Scale by PSC Inc., Webster, NY, February 2000, pages 1-2.

STATEMENT OF PERTINENCE

U.S. Patent No. 6,330,973 B1 to Bridgelall et al. discloses systems and techniques for reading optical codes, and more particularly to code reading systems with plural imaging or scanning modules pointed in various directions toward a target volume, which increase the likelihood that a code symbol on an arbitrarily oriented object in the target volume will be read. Other aspects of the invention relate to use and configuration of hand held readers, docking devices, operator side rails, arched tunnels and mirrors for increasing the coverage of the system..

U.S. Patent No. 6,237,852 B1 to Svetal et al. Discloses a multi-plane scanner which has a dual plane scanner with a horizontal window and a vertical window and a load cell/weigh platter weighing apparatus such that the weigh platter itself is a dual plane object with vertical and horizontal sections. The size and orientation of the planes of the weigh platter correspond to the size and orientation of the scan windows of the dual plane scanner, and each plane of the weigh platter has a transparent area (typically central), or "platter window", corresponding to a respective scan windows of the scanner for allowing transmission of scanned optical beams and optical barcode signals through each of the planes of the weigh platter. The platter is sufficiently rigid to permit accurate weighing, whether the object being weighed is placed solely on the horizontal section of the platter or in part on the vertical section. The vertical and horizontal sections of the platter are sealed together to prevent passage of debris therebetween.

U.S. Patent No. 6,223,986 B1 to Bobba et al. discloses a data reading system including an aiming aid system which creates a highly visible target or image in the scan volume at a preferred location for placement of the article to be scanned. In a preferred application, an overhead bar code scanner employs a rotating polygon mirror which scans one or more laser beams off pattern mirrors creating a complex pattern of scan lines down into the scan volume whereby the aiming aid is created by directing a laser beam onto a scanning mirror positioned on top of the polygon mirror generally along the rotational axis of the polygon mirror and then directing that beam out into the scan volume in the desired pattern, such as a circular aiming aid. Alternately, the aiming aid may be a multi-dimensional graphical image formed by holographic or diffractive optics.

U.S. Patent No. 6,213,397 B1 to Rando discloses a multiple window data reading device and method for reading symbols such as bar codes through each window, including sensing

conditions from each window and adjusting optical parameters for controlling data reading control through each of the windows.

U.S. Patent No. 6,117,080 to Schwartz discloses an ultrasonic diagnostic imaging system which produces ultrasonic breast images by acquiring ultrasonic data from a volumetric region of the breast, then volume rendering the data to produce a projection image from the data set. The diagnostic image reveals diagnostic information of the complete volume of breast tissue in a single ultrasonic image.

U.S. Patent No. 6,098,885 to Knowles et al. discloses a bar code scanner for stationary disposition at a counter for projecting an omnidirectional laser scanning pattern comprising first, second, third, fourth and fifth groups of parallel scan lines within a relatively narrow, yet diverging, volume, e.g., pyramid, cone, etc., centered about a projection axis. The scanner includes a compact housing mounted on an adjustable base. The housing includes a window, five stationary mirrors, a laser diode, a rotating reflective polygon for sweeping the laser beam from the diode across the mirrors and out a window so that the projection axis is substantially but not precisely perpendicular to the window. The scanner also includes a fixed curved collecting mirror and a concentrating lens to focus light which is reflected off of a bar code to a photodetector. One mirror extends along an axis parallel to the transverse axis to produce the first group of scan lines. The second and third mirrors are disposed opposite each other close to and laterally of the polygon and extending along respective axes at a small acute angle, e.g., 8 degrees, to the longitudinal axis to produce respective ones of the second and third group of scan lines. The fourth and fifth mirrors are disposed between the second and third reflecting mirrors, respectively, and each extends along a respective axis at a substantial acute angle, e.g., 48 degrees, to the longitudinal axis to produce respective ones of the fourth and fifth group of scan lines.

U.S. Patent No. 6,069,700 to Rudnick et al. discloses a system for producing high accuracy surface scans of large and/or complex parts using a host machine such as a machine for milling the part, a digitizing head attached to the host machine, and a remote laser tracking system for tracking the position of a retroreflector cube attached to the digitizing head.

U.S. Letters Patent 5,886,336 to Tang et al. discloses a bioptical-type optical scanner which includes a housing having first and second obliquely adjoining windows. Disposed in the housing is a laser for projecting a laser beam against a rotatable spinner having a plurality of mirrored facets for sequentially reflecting the laser beam to effect a scan beam. A plurality of pattern mirrors are optically aligned with the spinner for reflecting the scan beam through the first and second windows to effect a plurality of individual scan lines arranged in first and second patterns corresponding with the first and second windows. The pattern mirrors include a triad set of mirrors optically aligned in series between the spinner and the first window for scanning the first scan pattern to a back edge of the first window for scanning at least the back side of a multisided item.

U.S. Letters Patent 5,869,827 to Rando discloses a two window bioptical-type laser scanning system (the two windows are angled in a V fashion within a tunnel) wherein multiple laser sources cooperate with a rotating polygonal mirror and mirror groups to produce laser scanning beams that pass through the two windows.

U.S. Letters Patent No. 5,837,988 to Bobba et al. discloses an optical system and method for data reading. The preferred system is directed to a scanner which includes a multiple beam source, such as a laser diode and a beam splitter which generates a first optical beam and a second optical beam, the first optical beam being directed toward one side of a scanning optical element such as a rotating polygon mirror and to a first mirror array, the second optical beam is being simultaneously directed toward a second optical element such as another side of the rotating polygon mirror and then to a second and a third mirror array. The first mirror array is configured to generate a scan pattern through a vertical window and the second and third arrays are configured to generate scan patterns passing through a horizontal window. In combination, the three mirror arrays generate three sets of scan lines so as to scan the bottom and all lateral sides of an object being passed through the scan volume.

U.S. Patent No. 5,834,708 to Svetal et al. discloses a multi-plane scanner having a dual plane scanner with a horizontal window and a vertical window and a load cell/weigh platter weighing apparatus such that the weigh platter itself is a dual plane object with vertical and horizontal sections. The size and orientation of the planes of the weigh platter correspond to the size and orientation of the scan windows of the dual plane scanner, and each plane of the weigh platter has a transparent area (typically central), or "platter window", corresponding to a respective scan windows of the scanner for allowing transmission of scanned optical beams and optical barcode signals through each of the planes of the weigh platter. The platter is sufficiently rigid to permit accurate weighing whether the object being weighed is placed solely on the horizontal section of the platter or in part on the vertical section. The vertical and horizontal sections of the platter are sealed together to prevent passage of debris therebetween.

U.S. Letters Patent No. 5,801,370 to Katoh et al. discloses a multi-directional bar code reading device for reading an object that is to be read by projecting scanning beams from many directions, and includes a plurality of mirrors arranged around a beam scanning unit and a plurality of beam sources for emitting beams toward the beam scanning unit. The beam scanning unit is irradiated with beams generated from the plurality of beam sources, scanning beam are reflected by the plurality of mirrors and are projected from a plurality of directions onto an object to be read, and light reflected from the object is detected in order to read bar codes on the object to be read.

U.S. Letters Patent 5,723,852 to Rando et al. discloses a bioptical-type laser scanning bar code scanning system for use in retail checkout having a scanner housing; a plurality of surfaces facing a scan volume from different directions; and sets of pattern mirrors positioned adjacent the respective surfaces, the housing being positioned above the scan volume and containing one or more laser beam modules and/or a scanning mechanism for producing scanning beams which are routed to the pattern mirrors and out through the respective surfaces into the scan volume.

U.S. Letters Patent No. 5,705,802 to Bobba et al. discloses a bioptical-type optical system and method for data reading. The preferred system is directed to a scanner which includes a multiple beam source, such as a laser diode and a beam splitter which generates a first optical beam and a second optical beam, the first optical beam being directed toward one side of a scanning optical element such as a rotating polygon mirror and to a first mirror array, the second optical beam being simultaneously directed toward a second optical element such as another side of the rotating polygon mirror and then to a second and a third mirror array. The first mirror array

is configured to generate a scan pattern through a vertical window and the second and third mirror arrays are configured to generate scan patterns passing through a horizontal window. In combination, the three mirror arrays generate three sets of scan lines so as to scan the bottom and all lateral sides of an object being passed through the scan volume.

U.S. Letters Patent No. 5,693,930 to Katoh et al. discloses an optical scanner for optically scanning a bar code which includes a housing having a window formed on a selected surface thereof, a first scanning system, housed in the housing, for emitting a first scanning beam from the housing through the window and a second scanning system, housed in the housing, for emitting a second scanning beam from the housing through the window. The first scanning beam moves in a first scanning pattern and the second scanning beam moves in a second scanning pattern which is different from the first scanning pattern. Additionally, the second scanning pattern may be used for scanning a bar code having a selected special form.

U.S. Letters Patent No. 5,689,102 to Schonenberg et al. discloses an apparatus for laser scanning bar codes on an article. The scanner has a housing provided with a window; a laser light source for transmitting a laser beam which is disposed in the housing; a first mirror fixedly disposed in the housing for reflecting the laser light beam; a member mounted in the housing for rotatable driving and provided with second rotatable mirror; and a detector for receiving the laser light coming from the bar code reflected by the fixed mirror and the rotatable mirror and admitted via the window. The fixed and rotatable mirrors are disposed such that a pattern of a comparatively large number of relatively short scan lines partly overlapping each other is created as seen on the window. The scan lines first converge relative to each other to an area on a predetermined distance from the window and the scanlines diverge from each other beyond the area in the direction away from the window, so that the area, for instance on a distance 0-30 cm from the window, is traversed at different angles in each case by the scan lines.

U.S. Letter Patent 5,684,289 to Detwiler et al. discloses a bi-optical laser scanning system which employs a single laser beam to produce horizontal and vertical scan patterns. The laser scanning system includes a housing having vertical and horizontal apertures, a laser beam source, a mirrored spinner having a plurality of facets with different elevation angles for reflecting the laser beam in a plurality of directions, and a plurality of pattern mirrors within the housing for reflecting the laser beam from the spinner through the horizontal and vertical apertures to an article having a bar code label to be scanned. The laser scanning system also includes an optical transceiver for passing the laser beam and for collecting reflected light from the scanner article and a photodetector for generating signals representing the intensity of the light reflected from the article.

U.S. Patent No. 5,557,093 to Knowles, et al. discloses a laser projection scanner wherein a single VLD cooperates with a rotating mirror and an array of beam folding mirrors to project an omni-directional scan pattern through a scanning window, thereby producing a narrowly confined laser scanning volume for omni-directional scanning of bar code symbols located therein, while preventing inadvertent scanning of code symbols on nearby objects.

U.S. Letters Patent No. 5,495,097 to Katz et al. discloses a scanning system which has a plurality of optical scan units. Each optical scan unit includes means for emitting light toward an item bearing an indicia. Each optical scan unit also includes means for receiving light reflected

from the indicia and generating signals corresponding to the intensity of the reflected light. Also provided is a central control unit which includes means for combining together signals corresponding to the signals generated by at least two of the scan units to fully decode information contained on the indicia.

U.S. Letters Patent 5,491,328 to Rando discloses a bioptical-type bar code scanning system for use in retail checkout in which the scanning system has a conveyor defining a first surface and a second surface disposed adjacent the first surface and arranged generally orthogonally thereto forming a scan volume therebetween, sets of pattern mirrors positioned adjacent the respective surfaces, and one or more laser beam sources associated with a rotating mirror polygon for producing scan patterns which are routed to the pattern mirrors and out through the respective surfaces into the scan volume.

U.S. Letters Patent No. 5,475,207 to Bobba et al. discloses a bioptical-type optical system and method for data reading. The preferred system is directed to a scanner which includes a multiple beam service, such as a laser diode and a beam splitter which generates a first optical beam and a second optical beam, the first optical beam being directed toward one side of a scanning optical element such as a rotating polygon mirror and to a first mirror array, the second optical beam being simultaneously directed toward a second optical element such as another side of the rotating polygon mirror and then to a second and a third mirror array. The first mirror array is configured to generate a scan pattern through a vertical window and the second and third mirror arrays are configured to generate scan patterns passing through a horizontal window. In combination, the three mirror arrays generate three sets of scan lines so as to scan the bottom and all lateral sides of an object being passed through the scan volume.

U.S. Letter Patent 5,459,308 to Detwiler et al. discloses a bioptical-type optical scanner which employs a single laser beam in order to produce horizontal and vertical scan patterns. The optical scanner includes a housing having first and second apertures, a laser beam source, a mirror spinner having a plurality of facets with different elevation angles for reflecting the laser beam in a plurality of directions, and a plurality of pattern mirrors within the housing for reflecting the laser beam from the spinner through the first and second apertures to an article having a bar code label to be scanned. The optical scanner also includes an optical transceiver for passing the laser beam and for collecting reflected light from the scanned article and a photodetector for generating signals representing the intensity of the light reflected from the article.

U.S. Patent No. 5,361,158 to Tang discloses a multiple source optical scanner which employs a plurality of scanning light sources to increase the total depth of field and the density of the overall scan pattern. In a first embodiment, the lasers are of different wavelengths and all on. their individual depths of field are oriented end-to-end or in overlapping fashion. In a second embodiment, the lasers are of the same wavelength and are activated individually in sequence. Both embodiments employ collimating and focusing optics to produce scanning beams, collecting optics to collect light reflected from an article having a bar code label, and processing circuitry for generating signals having information about the articles based upon the intensities of the reflected light. The first embodiment additionally employs filter optics to separate the individual wavelengths of reflected light. Each wavelength of reflected light is processed through its own channel within the processing circuitry. The second embodiment employs modulation and control circuitry to turn each source on and off. A single channel is used for decoding.

U.S. Letters Patent No. 5,286,961 to Saegusa discloses a bar code reading apparatus in which a laser beam emitted from a laser beam source disposed in a casing is reflected by a rotational mirror to scan a bar code. The reflected laser beam is reflected by a fixed scan mirror having four mirror members continually arranged with given angles therebetween, and the resultant beams are irradiated outward through a read window formed in the casing. Multiple scan lines in multiple directions are obtained on a normal plane to the read window. These scan lines consist of two groups of vertical scan lines in the normal plane, and two groups of oblique scan lines inclined at a given angle with respect to the horizontal direction.

U.S. Letter Patent 5,229,588 to Detwiler discloses a bioptical-type optical scanner which employs a single laser beam in order to produce horizontal and vertical scan patterns. The optical scanner includes a housing having first and second apertures, a laser beam source, a mirror spinner having a plurality of facets with different elevation angles for reflecting the laser beam in a plurality of directions, and a plurality of pattern mirrors within the housing for reflecting the laser beam from the spinner through the first and second apertures to an article having a bar code label to be scanned. The optical scanner also includes an optical transceiver for passing the laser beam and for collecting reflected light from the scanned article and a photodetector for generating signals representing the intensity of the light reflected from the article.

U.S. Patent No. 5,206,491 to Katoh, et al. discloses a multi-directional bar code reading device for reading an object that is to be read by projecting scanning beams from many directions, which includes a plurality of mirrors arranged around a beam scanning unit and a plurality of beam sources for emitting beams toward said beam scanning unit. The beam scanning unit is irradiated with beams generated from the plurality of beam sources, scanning beams are reflected by the plurality of mirrors and are projected from a plurality of directions onto an object to be read, and light reflected from the object is detected in order to read bar codes on the object to be read.

U.S. Letters Patent No. 5,132,524 to Singh et al. discloses a multi-directional laser scanning apparatus which has a frame along with a plurality of lasers removably mounted in circular fashion to the frame for producing a plurality of light beams. A multi-faceted rotating mirror assembly is rotatably mounted to the frame and rotated by an electric motor and is aligned with a plurality of laser output beams. A plurality of fixed mirrors are attached in pairs to the frame and positioned for reflecting the light energy of the laser beam being reflected by the rotatable mirror assembly in a pattern onto a coded surface and positioned for receiving reflected beams from the coded surface and then directing the reflected beams in a reverse path onto the rotating mirror assembly and back towards each laser. A mirror mounted adjacent the output of each laser reflects each returning laser beam onto a photocell mounted to the frame for receiving the reflected signals from the coded surface and the signals are processed to read the coded signals.

U.S. Letters Patent No. 5,073,702 to Schuhmacher discloses a bar code scanner includes a source of a scanning light beam which is intercepted by a beam splitter which divides the laser beam into two secondary light beams. Each secondary light beam is projected through a focusing lens which focuses each beam at a different focal point. Both of the secondary light beams are directed at a second beam splitter which combines the two secondary light beams forming a

primary scanning light beam which is directed at a scanning area adjacent the scanner which will scan a coded bar code label at various distances from the scanner in accordance with the location of the two focal points.

U.S. Patent No. 5,039,184 to Murakawa et al. discloses an optical beam scanner for reading a bar code, which comprises a housing accommodating therein a beam generator for projecting a laser beam along a fixed axis, a rotary mirror rotatable about its axis and having a plurality of reflection surfaces arranged in a polygonal manner on the periphery of a body thereof, which surfaces receive and reflect the laser beam projected from the beam generator, and a unit for driving the rotary mirror to rotate at a predetermined speed during the operation. The housing is provided with a window on an upper wall thereof, through which passes the laser beam reflected from the respective reflection surfaces of the rotary mirror for scanning a bar code disposed above the window, and each of the reflection surfaces of the rotary mirror is formed by a part of a circular cylindrical surface cut out along a height thereof in an elongated rectangular shape and disposed so that a ridgeline is transverse to the axis of the rotary mirror. A direction of a normal vector to the reflection surface is smoothly varied in one direction along a scanning line on the reflection surface traced by sequential points of incidence of the laser beam across the reflection surface when the rotary mirror is rotated, whereby the reflected beam traces various linear scanning patterns, each corresponding to the respective reflection surface, on a plane of the window above which the bar code is scanned.

U.S. Patent No. 5,026,975 to Guber et al. discloses a system for scanning bar codes applied to articles, such as UPC or EAN codes of goods in a supermarket cashier stand. A laser scanner is provided with a window through which the scanning rays exit before they impinge on a scanning area. The laser scanner is arranged at the side of the transport flow and with its window tilted to the rear and being above the transport plane. The different rays of the cluster of scanning rays of the scanner are oriented such that they are concentrated and focused mainly on the scanning area in front of the window, that they do not leave the transport plane immediately opposite the window, and that generally a ray-free area is formed there where at least head and chest of an operating cashier that sits opposite to the scanner with its window, is situated. This arrangement, in which, for example, a laser scanner can be used, ensures that the operating casher sitting in front of the cash stand and essentially opposite of the scanning window is not struck by any ray of the cluster of scanning rays. This improves the acceptance of such an arrangement within the market place considerably.

U.S. Patent No. 5,000,529 to Katoh et al. discloses an optical scanner wherein coded bars are scanned by a laser beam to effect reading of a bar code of the coded bars. The optical scanner includes a rotary polygon mirror having a plurality of reflecting portions provided thereon around an axis of rotation thereof for reflecting a laser beam from a light source toward coded bars. Each reflecting portion of the rotary polygon mirror has a plurality of reflecting faces having different inclination angles from each other with respect to the axis of rotation such that an inclination angle of a line of intersection between adjacent reflecting faces of each reflecting portion with respect to the axis of rotation is different from an inclination angle of a line of intersection between adjacent reflecting faces of each of adjacent ones of the reflecting portions on the opposite sides of the reflecting portion with respect to the axis of rotation. Where the rotary polygon mirror of the construction is used, a scanning pattern which is constituted from scanning lines of various directions can be obtained from the rotary polygon mirror. The optical scanner can thus be reduce

in overall size and production cost of the device.

U.S. Patent No. 4,960,985 to Knowles discloses a compact laser scanner for use at a counter, such as a checkout counter, to produce a scanning pattern thereabove and into which a bar code can be inserted to enable the reading of the code. A scanner is of compact height and preferably comprises a housing of a height no greater than approximately six inches and taking up an area of no greater than 150 square inches. The housing includes a top having a window through which the scanning pattern is projected and indicia for directing the location of the bar code within the scanning pattern. The scanning pattern consists of three scan lines which intersect one another in a common area to produce a star-burst pattern when projected on a plane at approximately 45° to the plane of the window, while intersecting in approximately a triangular configuration when projected on a plane approximately perpendicular to the window. The scanner includes a laser tube, a rotating polygonal reflecting member and plural beam folding mirrors all disposed within the housing. The polygonal reflecting member is arranged to be mounted about a vertical axis. The laser tube is mounted laterally of the polygonal reflecting member and provides a substantially focused beam thereon. The rotation of the reflecting member causes the beam to sweep across the reflecting surfaces, which surfaces fold the beam and direct it out through the window to create the pattern. All sides of the scanner including its side walls, end walls, top and bottom walls are planar. This feature, and the compactness and light weight of the scanner enable the scanner to be positioned on any of its walls, above or below the counter, with the plane of the window at any angle with respect to the plane of the counter.

U.S. Patent No. 4,861,973 to Hellekson et al. discloses an optical system in a laser scanner for generating a cross bar X laser light beam scan pattern which includes a multi-faceted or –mirrored optical device mounted fro rotation about a vertical axis. The device has four primary mirrors oriented ninety degrees from one to the next about the vertical axis. The primary mirrors are tilted about respective horizontal axes relative to the vertical axis and adapted to receive and reflect a laser light beam as each primary mirror moves successively through a portion of each rotational cycle of the optical device. The optical arrangement also includes a multiplicity of secondary mirrors disposed in stationary positions relative to one another and to each of the primary mirrors as they move successively through the rotational cycle portion. The secondary mirrors are adapted to receive the laser light beam reflected from the primary mirrors and to reflect the same to trace scan lines of the laser light beam scan pattern at different orientations with respect to one another as the primary mirrors move successively through the portion of each rotational cycle.

U.S. Patent No. 4,800,256 to Broockman et al. discloses a holographic laser scanner which includes circuitry for adjusting the frequency with which an analog photodetector signal is ampled in accordance with the focal length of the scanning beam produced by the active holographic facet, as shown in two embodiments. In one embodiment, facet-edge signals are used to track the facets. A processor retrieves a predetermined frequency scaling factor appropriate for each facet. In the other embodiment, a holographic disk carries an auxiliary data track. The track has timing indicia with spatial frequencies dependent upon the focal length of the adjacent facet. The timing indicia are used to control the output of a voltage controlled oscillator in a circuit including a phase locked loop.

U.S. Patent No. 4,795,224 to Goto discloses an optical scanning pattern generator device

which includes a laser beam generator for generating a beam which is caused to trace a scan pattern within a scan zone by a scattering system. The unique scattering system includes a rotating mirror for directing the beam radially outward in a circle within a rotation plane. A rotating prism ring, rotating at a different rate than the rotating mirror reflects the beam from the rotation plane, the amount of refraction being dependent on the particular prism element within the ring which is intersected by the beam. The refracted beam then is reflected toward the scan zone by one of a series of fixed mirrors which are circumferentially arranged about the prism ring. The beam may be reflected off of a scan object and collected in collection apparatus. The primary industrial applicability of the invention is in an economical bar code reader device particularly adapted for retail usage.

U.S. Patent No. 4,794,237 to Ferrante discloses a holographic scanning system for scanning a bar coded label in which the light beams of a laser are directed at a set of holograms located on a rotating disk in which each hologram will generate an individual scan beam having a slightly different focal length and direction angle from that of the other holograms. Each of the scanning beams is directed at a plurality of mirrors which reflect the beams in the form of a scanning pattern on a scanning area through which a coded label on an article will pass. Each of the scanning beams is projected in an overlapping relationship on the scanning area, thereby providing an enhanced depth of focus enabling a more effective reading operation. The light reflected from the bar coded label is collected by the holograms for collimating the reflected light beams. The collimated light beams are directed at a lens member which focuses the received light beams on a photodetector for use in reading the bar coded label.

U.S. Patent No. 4,652,732 to Nickl discloses an apparatus for scanning a bar code affixed to an object and providing an electrical signal indicative of the scanned bar code. The apparatus includes a housing having a base portion and a window portion with the window portion being mounted above a rear section of the base portion. A forward section of the base portion has a flat top surface while the window portion has an optically transmissive window mounted in a side facing the top surface. The region above the top surface and adjacent the window defines a scanning region. Means are mounted within the housing for generating first, second and third scan patterns each comprised of a plurality of substantially parallel spaced apart light scan lines.

U.S. Patent No. 4,647,143 to Yamazaki et al. discloses a light-beam scanning apparatus mainly used for a bar code reader in a point-of-sale system to identify sold articles. The apparatus includes a light-beam emitting device, a hologram disk having a plurality of hologram segments with different diffraction characteristics mounted along its circumference and being rotated at a predetermined speed, and a deflecting device for directing the emitted light beam from the light-beam emitting device to one side of the hologram disk in a first direction. The scanning apparatus has a first mirror group including a plurality of mirrors placed in a second direction corresponding to the other side of the hologram disk, each of which mirrors is arranged to receive a diffracted light beam from a corresponding hologram segments, and a second mirror group including a plurality of mirrors, each of which mirrors is placed to receive a light beam reflected by a corresponding mirror of the first mirror group and to reflect the incident light beam to a predetermined space positioned in the first direction where an article attached with a bar code label is moved. In the apparatus, a light path from the other side of the hologram disk to the predetermined space has a predetermined length to form a predetermined scanning light pattern in the space.

U.S. Patent No. 4,333,006 to Gorin et al. discloses a holographic laser scanning system for scanning bar code indicia in which the light beam of a laser is directed to a first set of holograms located on a single rotating disc in which each hologram will generate an individual scan beam having a slightly different focal length and direction angle from that of the other holograms. The generated scanning beams are directed on a target area through which passes a label or object bearing a bar code indicia. Each of the scan beams is projected in an overlapping relationship on the target area, thereby providing an enhanced depth of focus enabling a more effective reading operation. The light reflected from the bar code indicia is picked up by a second set of holograms mounted on the rotating disc and focused at a point at which is located an optical detector for use in reading the bar code.

U.S. Patent No. 4,093,865 to Nickl discloses a system for scanning a code symbol consisting of a combination of spaced parallel bars affixed to an object for providing coded information related to the object. A flat panel defines a scanning region adjacent the panel for receiving objects having the code symbol. Light transmissive areas in the panel surface define a "double X bar" pattern consisting of a predetermined configuration of five bars. A laser beam is sequentially scanned at an acute angle to the panel surface in planes extending through the five bars into the defined scanning region at prescribed angles in relation to a first direction. When a received object containing said code symbol is moved within the defined scanning region from the first direction with the code symbol facing the panel or facing within almost ninety degrees of a second direction, opposite to the first direction, light scanned into the defined scanning region is reflected by the code symbol to a detection system, and the detection system provides an electrical signal indicative of the coded information.

U.S. Patent No. 3,947,816 to Rabedeau discloses an omnidirectional optical system which is arranged for scanning bar coded labels passing a rectangular scanning window with a plurality of interlaced scans in a plurality of differing directions whereby the labels are completely scanned irrespective of orientation. The interlaced and plural directive scanning rays are generated by directing a beam of light, from a laser or like light source, onto a rotating multi-faceted mirror for deflecting the light beam in a line extending in a given direction. A set of fixed mirrors is positioned to deflect the light beam in a number of laterally displaced scanning segments all parallel to the line extending in the given direction. A pair of fixed end mirrors are arranged for reflecting the light from half of the segments back onto the other half of the segments to provide the intersecting scanning pattern. Beam splitting mirrors are interposed in the light beam from the laser for providing additional light beams directed onto the rotating mirror to provide an interlaced raster.

U.S. Patent No. 3,902,048 to Fleischer et al. discloses an omnidirectional optomechanical system arranged for scanning bar coded labels passing a rectangular scanning window with a plurality of interlaced scans in a plurality of differing directions whereby the labels are completely scanned irrespective of orientation. The interlaced and plural directive scanning rays are generated by directing a beam of light, from a laser or like light source, onto a rotating multi-faceted mirror for deflecting the light beam into a mirror tunnel which is positioned at a predetermined angle at which there is further deflection of the light beam within the mirror tunnel in a number of laterally displaced and crossed scanning segments as appearing at the scanning window located at the end of the tunnel. Alternately, the mirror tunnel and the rotating mirror

serve in the sensing of the label under uniform overall illumination.

WIPO Publication No. WO 99/01839 by Scantech B.V. discloses a device for reading a code on an article, comprising: a housing provided with at least two windows for passage of radiation which are disposed at a relative mutual angle; radiation source means for transmitting radiation to the article, which radiation source means are arranged in the housing and comprise at least two separate radiation sources; a rotatable polygonal mirror for reflecting radiation coming from the radiation source means; a number of fixedly disposed mirrors for reflecting through the respective windows the radiation coming from the polygonal mirror; and detection means for detecting the radiation scattered by the code.

EPO Publication No. 0 663 643 A2 by Spectra-Physics Inc. discloses a point of sale bar code scanner, such as a grocery store check-out label scanner, that is attendant-free and completely automated in providing a listing or a total pricing of a customer's selected items. At each automated check-out, the customer initiates the process, places items on a conveyor, which carries each item separately through a scanner. The scanner reads all sides of each package, including the bottom of the package, since the bar code label could be located on any surface. Serial conveyors are used, and gates preferably control the advancement of items onto a conveyor, which will carry the item through the scanning area, such that only one item can be scanned at a time. The conveyor in the scanning area includes a series of belt strips through which an upwardly scanned beam can read the package bottom. Various methods and systems are disclosed for handling "no reads". The customer signifies termination of the process at the appropriate time. In the process the customer receives some sort of identification tag.

U.S. Publication No. 2001/0017320 to Knowles et al. discloses a bar code scanner for projecting a scanning pattern comprising a plurality of groups of scan lines, where each scan line in a given group is substantially parallel to other scan lines in the same group. The scanning pattern is provided within a relatively narrow, yet diverging, volume, such as a pyramid, cone, etc., as referenced to a projection axis. The scanner includes a housing having a window. Within the housing are a plurality of stationary mirrors, a laser beam generating mechanism, a rotating reflective polygon for sweeping the laser beam across the mirrors and a window, such that the projection axis intersects the window. The scanner also includes a fixed collecting mirror and a concentrating lens to focus light which is reflected off a bar code to a photodetector. One mirror extends along an axis substantially parallel to the transverse axis to produce a first group of scan lines. The second and third mirrors are disposed opposite each other laterally of the polygon and extending along respective axes at a first acute angle, illustratively 8 degrees, to the longitudinal axis to produce respective ones of a second and a third group of scan lines. The fourth and the fifth mirrors, respectively, each extend along a respective axis at a second acute angle, illustratively 48 degrees to the longitudinal axis, to produce respective ones of a fourth and a fifth group of scan lines.

The product brochure (dated February 2000) for the Magellan SL™ 360-Degree Scanner/Scale describes the PSC, Inc. bioptical bar code scanner capable of simultaneously reading the bottom and all four sides of a package.

A separate listing of the above references on PTO Form 1449 and a copy of these references are enclosed herewith for the convenience of the Examiner.

The Commissioner is also hereby authorized to charge any fee required in connection with this document to Deposit Account No. 16-1340.

Respectfully submitted,

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